

# NORFOLK BIODIVERSITY ACTION PLAN

## LITTORAL AND SUBLITTORAL CHALK

Exposed chalk in cliffs, wave-cut platforms and sub-tidal, often with flints.

Ref 2/H5	Tranche 2	Habitat Action Plan 5
Plan Author:	English Nature	
Plan Co-ordinator:	Coastal BAP Topic Group	
Plan Leader:	Natural England	
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### 1. CURRENT STATUS

#### National Status

- Chalk is a relatively soft and friable, easily eroded, sedimentary rock laid down in the Upper Cretaceous period. There are three main types of chalk (Upper, Middle, Lower) which differ in hardness and also content of flint (a siliceous rock deposited along bedding planes or vertical joints in chalk strata). Chalk at Flamborough Head (North Humberside) is notably different in being particularly hard due to compression by overlying strata and by glaciation. On the Isle of Wight and in Dorset, chalk is vertically bedded in contrast to horizontal bedding elsewhere.
- Coastal chalk is exposed principally in the south and east of England from Dorset in the west to Flamborough Head in the north. Marine and sub-aerial erosion of chalk has resulted in the formation of vertical cliffs and gently sloping shore platforms. The most extensive areas of littoral and sublittoral chalk occur in Kent and Sussex. In Britain, chalk forms less than 0.6% (113 km) of the coastline. In Northern Ireland, Upper Cretaceous chalk deposits belong to the Ulster White Limestone Formation with exposures on the County Antrim coast. The Northern Ireland chalk forms extremely hard, low porosity deposits with subsequent erosion forming cliffs and shore platforms, dominated by cobble and boulder spreads with sub-tidal reefs. Faults on the seabed offshore have also exposed Cretaceous deposits.
- The greatest proportion of European coastal chalk (57%) and many of the best examples of littoral and sublittoral chalk habitats are located on the coast of England and the UK has an international responsibility to ensure the conservation of this scarce habitat.
- Characteristic features of chalk coastlines are their geomorphological formations, such as cliffs and reefs, which create a range of micro-habitats of biological importance. Littoral-fringe and supralittoral chalk cliffs and sea-caves support algal communities unique to the substrate which comprise members of the Chrysophyceae and Haptophyceae such as *Apistonema carterae* and *Chrysofila* spp. Their restricted presence may be due to physical characteristics of chalk particularly its porosity and ability to remain moisture. The generally soft nature of chalk results in the presence of a characteristic flora and fauna, notably rock-boring invertebrates such as the spionid worm *Polydora* sp and piddocks. Littoral chalk also characteristically lacks species common on hard rocky shores (eg *Pelvetia canaliculata* and *Ascophyllum nodosum*), but supports distinct successive zones of algae and animals such as *Fucus* spp, kelps *Laminaria* spp and red algal turfs, or barnacles and mussels on wave-exposed shores.
- In south-east England, infralittoral communities are limited or absent, and animal-dominated circalittoral communities occur in relatively shallow waters due to local high turbidity. At Flamborough, the Isle of Wight and Studland, infralittoral communities are

more diverse and extend into deeper waters. Chalk habitats, especially in south-east England, are intrinsically low in species-richness due to the unusual friable and easily eroded nature of chalk and the prevailing harsh environment, characterised by extreme water temperatures, high levels of turbidity, siltation and scouring.

### Links with Other Action Plans

- The actions of this plan are linked closely to those of the Maritime Cliff and Slopes Habitat Action Plan. In both plans, attention is drawn to the need for avoiding non-sustainable coastal defence works and of raising awareness of the biodiversity and dynamic nature of these habitats and their role in coastal processes.

### Norfolk Status

- The main area is restricted to West Runton and Robin's Friend, immediately west of Sheringham. There is also some coastal chalk in places further east, near or below the low tide mark, but then without large flints.
- The chalk platforms and associated flints represent one of the few areas of intertidal rock in East Anglia and as such have considerable local importance from the biological and public amenity aspects. They are an oasis for rock dwelling organisms, similar to those on the rocky shores in south-east England and Flamborough Head, in a region that is otherwise characterised by sediment dwellers.
- The chalk rock foreshore at West Runton is unusual in that it is not backed by chalk cliffs, unlike sites elsewhere in Yorkshire and the south-east. The presence of irregularly shaped flints (paramoudras) on the chalk platform considerably enhances the number of macro-invertebrates that the shore is able to sustain, these are much fewer at Robin's Friend but this does have some blocks of conglomerate towards the upper shore with a fauna that is more usually subtidal. The number of invertebrate species recorded is similar to the most intensively studied chalk sites in the south-east.
- In a survey (George et al 1988), 153 species of invertebrates were recorded from four sites between Robin's Friend and East Runton. Common species include three species of periwinkle, small mussels, sea slaters, two species of sea anemone and two species of barnacle. Dog-whelks are abundant in places whilst the breadcrumb sponge occurs lower down the shore. The chalk platform is bored extensively by a species of bristle worm and two species of piddock. However, by far the largest concentrations of animals live under the boulders and cobbles lying on the chalk. These include shore, edible and small hermit crabs, scale worms, common starfish, various amphipods and isopods. Tubes of the sand masonworm are also common under these boulders. At the lowest tides, brittlestars are frequent together with a greater variety of sponges and bryozoa. The seaweed flora includes common brown bladder and spiral wracks, a variety of red species including frequent coralline weed and the green *Enteromorpha*. The larger wracks such as *Laminaria* are absent because there is no substrate on to which they can attach themselves.
- Some of the species present are at the northern limits of their range (eg, the small red algae *Gastroclonium reflexum*), whilst others such as the polychaete worm *Axionice flexuosa* (recorded once) are at their southern limit.

## 2. CURRENT FACTORS CAUSING LOSS OR DECLINE IN NORFOLK

- There is no evidence of loss in extent of this habitat in Norfolk, though on occasions sand and shingle may cover some areas that are normally exposed.

- Water quality has been a concern but should have improved at the West Runton site following replacement of an inshore sewerage outfall by a discharge c. 1km out to sea in the mid 1990s.
- A potential factor affecting the chalk biota is human disturbance of littoral plant and animal communities especially by trampling, stone-turning, small-scale fishery. The West Runton site is used extensively by school children on field courses.
- There is evidence from Hamond (2002) that many species have declined at the West Runton site, but the cause is not obvious.
- There may be impacts caused by the erection of revetments in the 1970s.
- Sea level rise and post-glacial land adjustment will submerge a greater area of littoral (intertidal) chalk platform. DEFRA has predicted an increase of 6mm per annum for south-east England.

### **3. CURRENT ACTION IN NORFOLK**

#### **Legal Status**

- The West Runton site is an SSSI for its geological (but not its biological) interest.
- Discharges to the sea are controlled by a number of EC Directives, including the Dangerous Substances, Shellfish (Waters), Integrated Pollution Control, Urban Waste Water Treatment, and Bathing Waters Directives. The Oslo and Paris Convention (OSPAR) and North Sea Conference declarations are also important. These commitments provide powers to regulate discharges to the sea and have set targets and quality standards to marine waters. An extensive set of standards covering many metals, pesticides and other toxic, persistent and bioaccumulative substances, and nutrients have been set under UK legislation.
- The proposed European Water Framework Directive aims to rationalise much of the EC's water legislation with an overall purpose of providing a framework for the protection of surface waters including coastal waters. This will aim at preventing the deterioration of aquatic ecosystems with a strong emphasis on ecological quality targets.

#### **Management, Research and Guidance**

- Marine biological surveys of littoral and sublittoral chalk reefs were undertaken as part of the impact study in relation to the sewerage outfall prepared for Anglian Water by the Natural History Museum. The site is also visited at intervals by the Norfolk and Norwich Naturalists' Society.

## **4. ACTION PLAN OBJECTIVES AND TARGETS**

### **National**

- Retain the extent of littoral and sublittoral chalk habitats unaffected by coastal defence and other engineering works.
- Where possible, increase the extent of littoral and sublittoral chalk habitats unaffected by coastal defence and other engineering works.
- Allow natural coastal processes to dictate, where possible, the geomorphology of the littoral and sublittoral environment.

### **Norfolk**

- Maintain and where possible enhance the existing littoral and sublittoral chalk habitat in Norfolk.

## Littoral and Sublittoral Chalk - Norfolk Action Plan

NATIONAL ACTION		NORFOLK ACTION	ACTION BY:	PARTNERS:
<b>5.1</b>	<b>Policy and Legislation</b>			
<b>5.1.1</b>	Influence the content of SMPs to recognise the dynamic nature of the littoral environment allowing, where possible, the natural processes of erosion.	Input into SMP3b.	NE, NNDC	
<b>5.1.2</b>	Promote planning policy that includes a presumption against development that, due to the progress of natural erosion, will require coastal defence works.	Ensure Local Development Frameworks are consistent with national policy in relation to this habitat.	NNDC	NE, EA
<b>5.1.3</b>	Harmonise the integration of Local Environment Action Plans with the proposed Water Framework Directive so that there is a comprehensive approach to securing water quality objectives for estuaries and coastal areas.	Not applicable.		
<b>5.2</b>	<b>Site Safeguard and Management</b>			
<b>5.2.1</b>	Ensure management schemes for Flamborough Head, Thanet coast and South Wight candidate SACs are complementary with the objectives of this plan.	No applicable.		
<b>5.2.2</b>	Promote the use of both statutory and non-statutory initiatives to conserve nationally and internationally important examples of littoral and sublittoral chalk habitats.	Consider designating as LNR.  Extend the interest features of the SSSI to cover the marine biology.	NNDC, NE  NE	

## Littoral and Sublittoral Chalk - Norfolk Action Plan

NATIONAL ACTION		NORFOLK ACTION	ACTION BY:	PARTNERS:
<b>5.2.3</b>	Encourage a presumption against littoral stabilisation works except where human life, or important natural or man-made assets, are at risk.	No action proposed		
<b>5.2.4</b>	Consider non-replacement of coastal cliff defences which have come to the end of their useful life.	Promote non-replacement through SMP3b.	NNDC	
<b>5.3</b> <b>5.3.1</b>	<b>Advisory</b> Prepare, publish and distribute to local authorities and port and harbour authorities by 2002 a guidance manual which describes the dynamic and sensitivity characteristics of littoral and sublittoral chalk habitats.	Circulate manual when produced.  Develop educational resources by 2010 to encourage responsible fieldwork on the site.	Coastal BAP Topic Group  Coastal BAP Topic Group	
<b>5.4</b>	<b>International</b> No action proposed.	No action proposed.		
<b>5.5</b> <b>5.5.1</b>	<b>Research and Monitoring</b> Commission research to identify coastal defence strategies that incorporate habitat conservation interests. The research should also identify locations where littoral stabilisation works may no longer be necessary in the future.	No action proposed.		
<b>5.5.2</b>	Assist in the development and implementation of monitoring programmes for littoral and sublittoral chalk habitats in line with the statutory reporting requirements for ASSI/SSSI and SAC management schemes.	Encourage collection of new records by local naturalists and others.	Coastal BAP Topic Group	

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NATIONAL ACTION		NORFOLK ACTION	ACTION BY:	PARTNERS:
<b>5.5.3</b>	Implement a surveying and monitoring programme by 2003 to provide data on the changes in extent and quality of littoral and sublittoral chalk resources in England and Northern Ireland. This will enable progress towards the objectives of this plan to be assessed. The information derived from this programme should be collated in conjunction with data derived from surveying the national maritime cliff and slope resource.	<p>Review existing surveys.</p> <p>Collate local knowledge of species records.</p> <p>Re-survey the site by 2010 and compare with pre-sewerage outfall surveys of the 1980s.</p> <p>Encourage diving surveys.</p> <p>Consider surveys of other chalk exposures elsewhere in North Norfolk.</p> <p>Ensure that Norfolk sites are included in any national survey.</p>	<p>NBRC</p> <p>NE</p> <p>NE</p> <p>NE</p> <p>NE</p> <p>Coastal BAP Topic Group</p>	
<b>5.5.4</b>	Commission a research programme for completion by 2005 to investigate the effects of invasive non-native species on the local ecology of littoral and sublittoral chalk, and determine how to eradicate such species.	Note the presence of any non-native species and report nationally.	Coastal BAP Topic Group	
<b>5.6</b>	<b>Communications and Publicity</b>			
<b>5.6.1</b>	Prepare and publish by 2000 a pamphlet for the general public describing the biodiversity of littoral and sublittoral chalk habitats and of the importance of allowing natural coastal processes such as erosion.	<p>Mail out leaflet when prepared.</p> <p>Consider installation of interpretation on site as part of LNR designation.</p> <p>Encourage links with field study centres through the Norfolk Coast Partnership.</p>	<p>Coastal BAP Topic Group</p> <p>NNDC</p> <p>Coastal BAP Topic Group</p>	

## **NORFOLK DISTRIBUTION**

The main area is restricted to West Runton and Robin's Friend, to the west of Sheringham.

## **REFERENCES AND CONTACTS**

Fowler, S. L. and Tittley, I. (1993). *The marine nature conservation importance of British coastal chalk cliff habitats*. English Nature Research Report No. 32. Peterborough: English Nature.

George, J. D., Tittley I., Price, J. H., and Fincham, A. A. (1988). The Macrobenthos of chalk shores in North Norfolk and around Flamborough Headland (North Humberside). Report to the Nature Conservancy Council. British Museum of Natural History.

Hamond, R. (2002). The Norfolk marine fauna, past and present. *Trans Norfolk & Norwich Nat Soc* 35(1):1-23.

Ministry of Agriculture, Fisheries and Food. (1995). *Shoreline Management Plans: A guide for coastal defence authorities*. MAFF PB 2197.